



Environmental Health Activities in Missouri



NCEH in Partnership with Missouri

The National Center for Environmental Health (NCEH) is part of the Centers for Disease Control and Prevention (CDC). NCEH's work focuses on three program areas: identifying environmental hazards, measuring exposure to environmental chemicals, and preventing health effects that result from environmental hazards. NCEH has approximately 450 employees and a budget for 2004 of approximately \$189 million; its mission is to promote health and quality of life by preventing or controlling diseases and deaths that result from interactions between people and their environment.

NCEH and partners in **Missouri** collaborate on a variety of environmental health projects throughout the state. In **fiscal years 2000–2004**, NCEH awarded more than **\$9.2 million** in direct funds and services to Missouri for various projects. These projects include activities related to controlling asthma, developing a biomonitoring plan, and preventing childhood lead poisoning. In addition, Missouri benefits from national-level prevention and response activities conducted by NCEH or NCEH-funded partners.

Identifying Environmental Hazards

NCEH identifies, investigates, and tracks environmental hazards and their effects on people's health. Following are examples of such activities that NCEH conducted or supported in **Missouri**.

Asthma

- **Controlling Asthma in American Cities Project**—To decrease asthma-related morbidity, NCEH funds grantees in urban communities, including the **St. Louis Regional Asthma Consortium** in **Missouri**, to use innovative collaborative approaches to improve overall asthma management among urban children up to 18 years of age. Funding began in fiscal year 2001 and ends in fiscal year 2008.
- **Addressing Asthma from a Public Health Perspective**—NCEH is funding the **Missouri**

Department of Health and Senior Services (MDHSS)

to develop an asthma-control plan that includes disease tracking, science-based interventions, and statewide partnerships to reduce the burden of asthma in the state. The department developed and is implementing its comprehensive asthma-control plan and enhancing its asthma surveillance system. Funding began in fiscal year 2001 and ends in fiscal year 2007.

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Environmental Public Health Tracking

- **Infrastructure Enhancement and Data Linkage Demonstration Project**—NCEH funds the **MDHSS Office of Information Systems** to initiate electronic reporting of laboratory results for blood lead levels and to document environmental assessments and abatement activities. NCEH also funds the MDHSS Office of Information Systems to create linkages between **Missouri Department of Natural Resources** lead smelter and mining site databases and other surveillance databases. Accomplishments include developing and deploying a new Web-based application for entering lead data into the Missouri Health Surveillance Information System and initiating electronic reporting and posting of laboratory results for blood lead levels from 40 hospital laboratories. NCEH funds helped MDHSS develop a technique for local health agencies to plan and focus childhood lead poisoning prevention activities and establish partnerships with other state agencies, local health departments, federal health and environmental agencies, academic institutions, the state medical association, and the Governor's Advisory Council on Lead Poisoning. MDHSS also used NCEH funds to establish a list of priority indicators (blood lead, pesticides, indoor air quality,

school asthma) and to develop an additional data integration project, potentially involving data from the Toxic Release Inventory as well as asthma, cancer, and birth defects registries. Funding began in fiscal year 2002 and ends in fiscal year 2005.

Measuring Exposure to Environmental Chemicals

NCEH measures environmental chemicals in people to determine how to protect people and improve their health. Following are examples of such activities that NCEH conducted or supported in **Missouri**.

Funding

- **Antiterrorism Funding to Increase State Chemical Laboratory Capacity**—In fiscal year 2004, CDC provided more than \$1 million to **Missouri** to help expand chemical laboratory capacity to prepare for and respond to chemical-terrorism incidents and other chemical emergencies. This expansion will allow full participation of chemical-terrorism response laboratories in the Laboratory Response Network.
- **Biomonitoring Grants**—In fiscal years 2001 and 2002, NCEH awarded planning grants to **Missouri** to develop an implementation plan for a state biomonitoring program. In this way, the state could make decisions about which environmental chemicals within its borders were of health concern and could make plans for measuring levels of those chemicals in the Missouri population.

Studies

- **Variability of Urinary Biomarkers in Pregnant Women**—Phthalates, ubiquitous industrial chemicals used in a variety of applications, are among the most abundant synthetic chemicals in the environment. Phthalates have come under increased scrutiny because of growing evidence of their reproductive toxicity in animals. Urinary phthalate metabolites, specifically those known as phthalate monoesters, have been used as biomarkers of people's exposure to phthalates. Although appreciable human exposure to phthalates has been established, few studies have examined phthalate levels in relation to reproductive outcomes in people, and none have examined exposure during pregnancy.

The purpose of this small study, conducted in collaboration with the **University of Missouri**,

is to assess variability in levels of phthalates in individual women as well as changes in phthalate levels of all study participants over the course of their pregnancies. NCEH laboratory scientists analyzed 27 urine samples (3 from each trimester) from three pregnant women for 10 phthalate monoesters. Results were sent to the collaborators in May 2003. Data analysis and interpretation are ongoing.

- **The Study for Future Families (SFF)**—This study examined semen quality and exposure to a mixture of environmental chemicals (pesticides, phthalates, and phenols) in fertile male participants. SFF is a population-based, cross-sectional study of semen quality in partners of pregnant women. Participants were non-Hispanic white men aged 21–40 years from **Missouri** and Minnesota. The men, nonsmokers who did not use steroids, had no family history of cryptorchism (a developmental defect marked by the failure of the testes to descend into the scrotum). NCEH analyzed 30 urine samples collected from 30 participants for 10 phthalate metabolites; results were sent to collaborators in May 2002. In summer 2003, NCEH analyzed 54 urine samples from 54 participants for 10 phthalate metabolites and bisphenol A (an industrial chemical used to make polycarbonate plastic resins, epoxy resins, and other products). These results were sent to collaborators in July 2003. Analysis of the results is ongoing.
- **The Phthalates in Pregnant Women and Children (PPWC) Study**—The PPWC study measures phthalate metabolites in 200 mothers and children to examine sources of exposure and links between phthalate levels and abnormalities in reproductive development. For each of these mother-child pairs, urine samples will be collected from the mother both during and after the pregnancy and from the child at 3 or 12 months of age (depending on the date of birth) and at 18 months of age. Study participants have been recruited from **Missouri**, California, and Minnesota.

In spring 2004, NCEH measured levels of nine phthalate metabolites in 214 urine samples from pregnant women. Results were sent to collaborators in May 2004. This study is ongoing.

- **Investigation of Anemia in Women, Infants, and Children (WIC) Participants Aged 12–35 Months**—This study, performed in collaboration with CDC’s National Center for Chronic Disease Prevention and Health Promotion, is a nutritional screening of new clients aged 12–35 months who participate in the WIC Special Supplemental Nutrition Program. Two Missouri WIC clinics (**St. Louis** and **Kansas City**, which have new clients who have anemia rates of at least 30%) recruited participants. NCEH’s laboratory measured iron-status indicators (e.g., serum iron/total iron-binding capacity, serum ferritin, erythrocyte protoporphyrin, and serum transferrin receptor), markers of infection (e.g., C-reactive protein), and blood lead levels. Results were reported to collaborators throughout 2001 and 2002 and again in 2004. All results are under evaluation.

- **Communitywide Blood Lead Screening in Herculaneum**—Operating for more than 100 years, the Doe Run Company’s lead smelter in **Herculaneum** is the largest and oldest smelter operating in the United States. During fiscal year 2001, state officials discovered that highly concentrated lead ore was being spilled from trucks along residential streets. The ore, which was being trucked to the smelter, had previously been transported by rail. Elevated levels of lead were discovered along streets, along the city park roadside, and at the smelter entrance. In response to the spills of lead ore along the streets, **MDHSS** advised state and federal regulatory agencies that “an imminent and substantial public health threat” was being posed to the residents of the community. In addition, a public health consultation issued by the Agency for Toxic Substances and Disease Registry (ATSDR) in July 2001 found that past and present exposures to lead in the community posed a persistent and unacceptable public health hazard.

The state health department, with help from ATSDR, tested more than 600 residents during two voluntary communitywide blood-lead screenings. The NCEH laboratory analyzed blood samples for lead. Of the 124 children younger than 6 years of age who were screened for lead exposure, 36 (29%) had blood lead levels at or above the level of health concern. In 2002,

95 additional blood samples from children were analyzed; 8 (just more than 8%) of the samples had blood lead levels above the level of health concern. As a result of these findings, a workgroup composed of community members, consultants, and representatives of the **Missouri Department of Natural Resources**, MDHSS, ATSDR, and the U.S. Environmental Protection Agency developed a public health action plan to mitigate and prevent adverse health effects caused by exposure to lead at or near the smelter. This plan includes continued monitoring of residents’ exposure to lead and implementation of a health education plan to raise awareness within the community of health effects associated with exposure to lead, ways to reduce exposure, and ways to care for children with elevated blood-lead levels.

- **Urinary Cadmium and Arsenic Testing in Herculaneum**—NCEH, with **MDHSS**, conducted an investigation to determine exposure to cadmium and arsenic among residents who live near the Doe Run smelter in Herculaneum. Investigators measured urinary cadmium levels to check the possibility of past exposure to cadmium. Cadmium causes severe, potentially lethal, health effects in people; cadmium and cadmium compounds may reasonably be anticipated to be carcinogens. Urinary cadmium levels can be used to gauge the total amount of cadmium in a person’s body as well as how much cadmium that person has been exposed to over time.

Urinary arsenic levels were measured three times over a 3-month period to determine whether current arsenic levels in the community’s environment are a health hazard. Arsenic causes severe, potentially lethal, health effects, including cancer, in people. NCEH’s laboratory has reported the results of 85 total and speciated arsenic analyses (seven arsenic species per specimen) as well as the results of 30 analyses of cadmium in urine to collaborators. Data evaluation is ongoing.

Services

- **Helping State Public Health Laboratories Respond to Chemical Terrorism**—NCEH is working with **Missouri**’s public health laboratory to prepare state laboratory scientists to measure chemical-terrorism agents or their metabolites in people’s blood or urine. NCEH is transferring

analytic methods for measuring chemical-terrorism agents (including cyanide-based compounds and other chemicals) to Missouri. In addition, NCEH instituted a proficiency-testing program to measure the comparability of the state's analytic results with results from the NCEH laboratory.

- **Lipid Standardization Program (LSP)**—NCEH provides two lipid research laboratories in **Missouri** with accuracy-based standardization support for analytic measurement. These laboratories are involved in one or more ongoing lipid metabolism longitudinal studies or clinical trials that investigate risk factors and complications associated with cardiovascular disease. The LSP, supported by NCEH's Lipid Reference Laboratory, provides quarterly analytic performance challenges and statistical assessment reports that allow program participants to monitor performance over time. Monitoring performance over time ensures the accuracy and comparability of study results and findings.
- **Newborn Screening Quality Assurance Program**—NCEH provides proficiency-testing services and dried-blood-spot, quality-control materials to monitor and help assure the quality of screening program operations for newborns in **Missouri**. The importance of accurate screening tests for genetic metabolic diseases cannot be overestimated. Testing of blood spots collected from newborns is mandated by law in almost every state to promote early intervention that can prevent mental retardation, severe illness, and premature death.
- **National Glycohemoglobin Standardization Program (NGSP)**—NCEH supports improved clinical glycohemoglobin (GHB) measurement—a demonstrated indicator of glycemic condition and one aspect of diabetes diagnostic care—through long-term standardization of current and emerging testing methods. NCEH awarded a contract for this standardization program to the **University of Missouri Diabetes Diagnosis Laboratory**, which operates NGSP. NGSP is the only standardization program for GHB testing which ensures that clinical laboratory results are comparable to values reported in the Diabetes Control and Complications Trial. The trial was a study that established the relation among GHB

values, mean blood-glucose levels, and risks for chronic diabetic complications.

To ensure that GHB measurements are accurate indicators of a patient's physiologic status, additional testing is critical, and the procedure for measuring key analytes associated with diabetic conditions must be standardized. C-peptide measurements—indicators of insulin production—are used to assess whether high blood glucose is caused by reduced insulin production or reduced cellular glucose uptake. NCEH, in collaboration with the National Institute of Diabetes and Digestive and Kidney Diseases, has expanded the goals of this project to establish, evaluate, and maintain standardization of C-peptide measurement.

Preventing Health Effects That Result from Environmental Hazards

NCEH promotes safe environmental public health practices to minimize exposure to environmental hazards and prevent adverse health effects. Following is an example of such activities that NCEH conducted or supported in **Missouri**.

- **Childhood Lead Poisoning Prevention Program**—The **Missouri Childhood Lead Poisoning Prevention Program (MO CLPPP)** has received NCEH funding since 1993. In 2001, the program screened 65,088 children for lead poisoning. The number of children under 6 years of age who had elevated blood lead levels decreased from 5,061 in 1997 to 3,342 in 2001. These decreases in blood lead levels are due to state program efforts funded in part by NCEH. MO CLPPP is using NCEH funds to increase lead testing in identified high-risk areas of Missouri and to maintain and enhance the statewide surveillance system and case management activities. MO CLPPP is also using NCEH funds to increase primary prevention efforts among children and pregnant mothers and to expand strategic partnerships.

For more information about NCEH programs, activities, and publications as well as other resources, contact the NCEH Health Line toll-free at 1-888-232-6789, e-mail NCEHinfo@cdc.gov, or visit the NCEH Web site at www.cdc.gov/nceh.